

# Radiological Dispersion Devices (RDD)

July 2002

## Fact Sheet #37

Environmental Health Programs  
Division of Radiation Protection



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### LOCALIZED SOURCES

Small amounts of radioactive material in single or multiple small containers the size of test tubes, shoeboxes or briefcases may be used as dispersal devices in a terrorist incident. An instance like this will be a highly localized event with the affect of causing fear and disruption in the population.

In a liquid form the material could be dumped in a water reservoir, or spread over areas large or small as it is being released from a vehicle or an aircraft. Because the radioactive source is small, the expected exposure to individuals would likewise be small. The larger the area, the more disperse the contaminant becomes resulting in a lessened impact to the environment and individuals health. The harm from this kind of source would primarily be a psychosocial effect with little to no immediate adverse health effects. Similarly, the probability for long-term health effects as a result of these low levels of ionizing radiation would be small.

Most of the exposure from a well-localized dispersion would be external. Some internal contamination could occur if the radioactivity is inhaled or ingested. Protective clothing will help to reduce exposure to radiological contamination exposure as protective clothing would for any hazardous material. In a response to an event such as this, it is likely there will be no effective safeguard against the penetrating effects of radiation. Caution should be exercised in areas with detectable levels of radiation to reduce exposures.

To reduce exposure to radiation and keep doses As Low As Reasonably Achievable (ALARA), minimize the time spent in the area, maintain distance from the source, or shield against the radiation. Sources of radiation are generally easily located with the use of radiation detection instruments. Additional information can be found in Fact Sheet #19 "What on Scene Responders Need to Know".

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## WIDELY DISPERSED SOURCES

The dispersion of radioactive materials over large areas through the use of explosives coupled with large amounts of radioactive materials is a cause for greater concern. A larger amount of radioactive material would likely be used in these devices and casualties may include those who have received life-threatening levels of exposure.

The use of solid radioactive material would be of low enough activity that the construction and delivery of the device would not seriously inhibit the terrorist from carrying out the attack. Large sources of penetrating radiation are difficult to handle safely and without detection by authorities. It would take considerable technical expertise and sophisticated resources to design and fabricate an effective weapon out of this type of device because of the complications to adequately protect both those who will construct and deploy the weapon.

Although the most likely RDD involves high explosives combined with solid radioactive materials in the form of pellets or powder, the material could also be in solution or as a radioactive gas.

The dispersal area depends on the amount of explosive used, atmospheric conditions and the radioactive materials propensity to adhere to dust or other materials dispersed by the explosion. Gases will escape but particulates and debris will contaminate surface areas. In a downtown RDD explosion, it is most likely that only a small area of a few city blocks would be involved. Similar to a chemical spill, precaution must be used to avoid spreading contamination into other areas. The exposures are still expected to be low in such a scenario. The health and psychosocial effects after the explosion would be similar to those of a localized event but encompass a larger population.

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### Source

NCRP Report No. 138

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